VT RAPID GEOMORPHIC ASSESSMENT ---- CONFINED STREAMS

Stream Name:		Segment I.D:								
Location:			Date:							
Observers:			Elevation: ft.							
Organization / Agency:			Weather:							
Reference Stream Type	controlled gorge, alluvial fan, or natu	☐ Modified ally braided system see Handbook Protocols?	Rain Storm within past 7 da	ays: Y / N						
Adjustment Process			ion Category	1						
riajustinent i rocess	Reference	Good	Fair	Poor						
7.1 Channel Degradation (Incision) • Exposed till or fresh substrate	☐ Little evidence of localislope increase or nickpoints		☐ Sharp change in slope, head cuts present, and/or tributaries rejuvenating.	☐ Sharp change in slope and / or multiple head cuts present. Tributaries rejuvenating.						
in the stream bed and exposed infrastructure (bridge footings). • New terraces or recently	☐ Incision Ratio $\ge 1.0 < 1$ and Where channel slope $< 4\%$ Entrenchment ratio > 1.4	and Where channel slope < 4%	Incision Ratio $\geq 1.4 < 2.0$ and Where channel slope $< 4\%$ Entrenchment ratio > 1.4	☐ Incision ratio ≥ 2.0 and Where channel slope < 4%						
abandoned flood prone areas. • Headcuts, or nickpoints significantly steeper bed segment	Where channel slope > 4% Entrenchment ratio > 1.2	Where channel slope $\geq 4\%$	Entrenchment ratio > 1.4 Where channel slope ≥ 4% Entrenchment ratio > 1.2	Entrenchment ratio ≤ 1.4 Where channel slope $\geq 4\%$ Entrenchment ratio ≤ 1.2						
and comprised of smaller bed material than typical steps. Freshly eroded, vertical banks. Alluvial sediments that are	☐ Step-pool systems have complement of expected ber features, steps complete with coarser sediment (≥ D80).	complement of expected bed	Ill Step-pool systems with incomplete (eroded) steps, dominated by runs.	☐ Step-pool bed features eroded and replaced by plane bed features.						
 imbricated (stacked like dominoes) high in the bank. Tributary rejuvenation, observed through the presence of 	☐ No significant human- caused change in channel co finement.	Only minor human-cause change in channel confinement.	d Significant human-caused change in channel confinement but no change in valley type.	☐ Human caused change in valley type.						
nickpoints at or upstream of the mouth of a tributary. • Depositional features with steep faces, usually occurring on the downstream end.	☐ No evidence of historic present channel straightenin dredging, and/or channel av sions.	g, dredging and/or channel avul-		Extensive historic channel straightening, commercial gravel mining, and/or recent channel avulsions.						
Stream Type Departure Type of STD:	☐ No known flow alteration (i.e., increases in flow and/or decreases in sediment supply	and/or minor reduction of	☐ Major historic flow alterations, greater flows and/or reduction of sediment load.	☐ Major existing flow alterations, greater flows and/or reduction of sediment load.						
Score: Historic	20 19 18 17	16 15 14 13 12 1	1 10 9 8 7 6	5 4 3 2 1						
7.2 Channel AggradationShallow pool depths.Abundant sadiment descrition	☐ Step-pool systems have complement of expected bed features, complete steps and deep pools.		incomplete steps, dominated by runs. Pools filling with fine	☐ Step-pool bed features are filled with sediment and stream appears as a plane bed.						
 Abundant sediment deposition on side bars and unvegetated mid-channel bars and exten- sive sediment deposition at obstructions, channel con- strictions. Islands may be 	☐ Minor side or delta bars present. Minor depositional features typically less than h bankfull stage in height.	☐ Single to multiple mid- channel, side or diagonal bars	☐ Multiple unvegetated mid-	☐ Multiple unvegetated mid- channel, side or diagonal bars or islands present, splitting or braiding flows even under low flow conditions.						
 Most of the channel bed is exposed during typical low flow periods. 	☐ No apparent increase in gravel / sand substrates (pet count).	ble gravel / sand substrates that may comprise over 50% of th sediments.	Large increase in gravel / sand substrates that may comprise over 70% of the sediments.	Homogenous gravel/sand substrates may comprise over 90% of the sediments. Fine sediment feels soft underfoot.						
 Coarse gravels, cobbles, and boulders may be embedded with sand/silt and fine gravel. 	□ Low width/depth ratio ≤ 20 for channel slopes < ≤ 12 for channel slopes ≥	1% $> 12 \le 20$ for slopes $\ge 4\%$	$> 30 \le 40$ for slopes $< 4\%$ $> 20 \le 30$ for slopes $\ge 4\%$	High width/depth ratio > 40 for channel slopes < 4% > 30 for channel slopes \ge 4%						
	No known flow alteration (i.e., decrease in flow and/or increase in sediment supply)	and / or increase in sediment load. Flood-related sediment working through reach, seen a enlarged bars.	as	☐ Major existing flow alterations, extreme reduction in flows and / or increase in sediment load.						
Stream Type Departure Type of STD:	☐ No human-made constrictions causing upstream deposition.	Human-made constriction smaller than floodprone widtl causing minor to moderate upstrm / dwnstrm deposition.		Human-made constrictions significantly smaller than bankfull width, causing extensive upstrm / dwnstrm deposition and flow bifurcation.						
Score: Historic	20 19 18 17	16 15 14 13 12 1	1 10 9 8 7 6	5 4 3 2 1						

				Co	ndition	1 Cate	egory	7							
Adjustment Process	Reference	ce		Good				Fair]	Poor		
7.3 Widening Channel	☐ Low width/depth ≤ 20 for channel slo ≤ 10 for channel slo	opes < 4%	> 20 \le 3	moderate V 30 for slopes 2 for slopes	< 4%	> 3	$30 \le 40$	e to high for slop for slop	oes < 49	%	> 40	0 for ch		h ratio lopes < lopes <u>></u>	
 Active undermining of bank vegetation on both sides of the channel; many unstable bank overhangs that have little veg- etation holding soils together. Erosion on both right and left banks. 	Little to no scour sion at the base of bo Negligible bank over fracture lines at top o leaning trees or freshi posed tree roots.	th banks. hangs, of banks,	Minima and erosion banks. Sor ture lines a ing trees ar tree roots.	☐ Moderate to high scour and erosion at the base of both banks. Many bank overhangs, fracture lines at top of banks, leaning trees and freshly exposed tree roots.					Continuous and laterally extensive scour and erosion at the base of both banks. Continuous bank overhangs, fracture lines at top of banks, leaning trees and freshly exposed tree roots.						
 Recently exposed tree roots (fresh roots are 'green' and do not break easily, older roots are brittle and will break easily in your hand). Fracture lines at the top of the 	☐ Incision Ratio ≥ 1 and Where channel slope Entrenchment rati Where channel slope Entrenchment rati	< 4% io > 1.4 e > 4%	Where char Entrend Where char	n Ratio ≥ 1.2 and nnel slope $<$ chment ratio nnel slope \geq chment ratio	Incision Ratio $\geq 1.4 < 2.0$ and Where channel slope $< 4\%$ Entrenchment ratio > 1.4 Where channel slope $\geq 4\%$ Entrenchment ratio > 1.2					☐ Incision ratio ≥ 2.0 and Where channel slope $< 4\%$ Entrenchment ratio ≤ 1.4 Where channel slope $\geq 4\%$ Entrenchment ratio < 1.2					
 bank that appear as cracks parallel to the river. Evidence of landslides and mass failures. Mid-channel bars and side 	Minor side or del present. Depositiona typically less than has stage in height.	l features	channel or Minor depo	to multiple i side bars pro sitional feat ss than half ght.	☐ Multiple unvegetated mid- channel or side bars present. Major sediment buildup at the head of constrictions leading to steep riffles and/or flood chutes.					☐ Multiple unvegetated mid- channel, side or diagonal bars or islands present, splitting or braiding flows even under low flow conditions.					
 bars may be present. Urbanization and stormwater outfalls leading to higher rate and duration of runoff and channel enlargement. 	No known channel flow alterations (i.e., in flow and/or change ment supply).	increase	shed input sediment.	increase in voof flows and Episodic (floresulting in ement.	Major channel and/or flow alterations, increase in flows and/or change in sediment load (increase or decrease).				'S	☐ Major and extensive chan- nel and/or flow alterations, increase in flows and/or change in sediment load (increase or decrease).					
Score: Historic	20 19 18	17 16	15 14	13 1	2 11	10	9	8	7	6	5	4	3	2	1
7.4 Change in PlanformFlood chutes present.	Low bank erosion side bends, little or no in sinuosity within the	o change	bank erosio may includ	moderate la on on outside e minor cha rithin the rea	☐ Moderate to high lateral bank erosion on most outside bends, may include moderate change in reach sinuosity.					Extensive lateral bank erosion on most outside bends, may include major change in sinuosity within the reach.					
 Channel avulsions evident or impending. Change or loss in bed form structure, sometimes resulting in a mix of plane bed and 	Little or no evide ment buildup, only m or side bars typically half bankfull stage in	ninor delta less than	delta, or sid	to multiple d mid-chann le bars. Son hannel avul	☐ Multiple unvegetated mid- channel, delta, or side bars, typically greater than bankfull stage in height. Evidence of past channel avulsion and/or islands.					Multiple and major mid- channel, delta, and/or side bars. Evidence of recent channel avulsion, multiple thread chan- nels, and islands.				oars.	
 a mix of plane bed and step-pool forms. Island formation and/or multiple thread channels. 	No human-caused tion of channel planf or the width of the floarea.	form and /	tion of char and/or wid area resulti encroachm	to moderate nnel planfor th of the flo ng from floc ent, channel ng, or dredgi	Major alteration of channel planform and/or width of the floodprone area resulting from historic encroachment, dredging, or channel straightening.					☐ Major alteration of channel planform and the width of the floodprone area resulting from recent and extensive encroachment, dredging, and/or channel straightening.					
	Human-made cor causing only negligib stream deposition.	ole up-	smaller tha causing mi upstrm / dv	-made cons n floodpron nor to mode vnstrm depo	Human-made constrictions significantly smaller than floodprone width, causing major upstrm / dwnstrm deposition.					☐ Human-made constrictions significantly smaller than bankfull width, causing extensive major upstrm / dwnstrm deposition and flow bifurcation.					
Score: Historic	20 19 18	17 16	15 14	13 1	2 11	10	9	8	7	6	5	4	3	2	1
7.5 Channel Adjustme	ent Scores – Streeference Good			Channel Poor	Evoluti STD			oric	Cor	nditio	n Rati	ing:	Chai	nnel	7

						···· <i>o</i> ·		
Condition	Reference	Good	Fair	Poor	STD*	Historic	Condition Rating:	Channel
Departure	N/S	Minor	Major	Extreme	SID	Historic	(Total Score / 80)	Evolution
Degradation								Stage:
Aggradation								G
Widening							7.6 Stream	
Planform							Condition:	
Sub-totals:					Total Score:			

Channel Adjustment Processes:

*STD = Stream Type Departure where existing stream type is no longer the same as the reference

7.7 Stream Sensitivity: Very Low / Low / Moderate / High / Very High / Extreme

- * Channel Condition "default" to **poor** significant flood damage (not able to get accurate channel data) Y/N;
- * Channel Condition default to poor Due to channel alterations from work in channel after flood: Y/N
- * Stream Sensitivity "default" to **poor** significant flood damage (not able to get accurate channel data) Y/N;
- * Stream Sensitivity "default" to poor Due to channel alterations from work in channel after flood: Y/N

VT RAPID GEOMORPHIC ASSESSMENT ----- UNCONFINED STREAMS

	For narrow and broad to very broad valley	types (confinement ratio ≥ 4) Typically Ri										
Stream Name:			Segment I.D:									
		I	Date:									
			Town: Elevation: ft.									
Organization / Agency:			Weather:	11.								
Reference Stream Type			Rain Storm within past 7 da	avs: Y / N								
71	(If alluvial fan or naturally braided syste	m see Handbook Protocols)	1									
Adjustment Process			n Category									
Aujustment i rocess	Reference	Good	Fair	Poor								
7.1 Channel Degradation (Incision)	Little evidence of localized slope increase or nickpoints.	☐ Minor localized slope increase or nickpoints.	☐ Sharp change in slope, head cuts present, and/or tributaries rejuvenating.	Sharp change in slope and / or multiple head cuts present. Tributaries rejuvenating.								
• Exposed till or fresh substrate in the stream bed and exposed infrastructure(bridge footings)	Incision Ratio $\geq 1.0 < 1.2$ and Entrenchment ratio > 2.0	Incision Ratio $\geq 1.2 < 1.4$ and Entrenchment ratio > 2.0	☐ Incision Ratio $\geq 1.4 < 2.0$ and Entrenchment ratio > 2.0	☐ Incision ratio ≥ 2.0 OR Entrenchment ratio ≤ 2.0								
 New terraces or recently abandoned floodplains. 												
 Headcuts, or nickpoints that are 2-3 times steeper than typ- ical riffle. Freshly eroded, vertical banks. 	☐ Riffle heads complete and comprised of courser sediments (≥D80). Full complement of expected bed features.	Riffle heads mostly complete. Riffle lengths may appear shorter. Full complement of expected bed features.	Riffles or dunes may appear incomplete; bed profile dominated by runs.	Riffle-pool or ripple-dune features replaced by plane bed features.								
 Alluvial (river) sediments that are imbricated (stacked like dominoes) high in bank. Tributary rejuvenation, ob- 	☐ No significant human- caused change in channel con- finement or valley type.	Only minor human-caused change in channel confinement but no change in valley type.	☐ Significant human-caused change in channel confinement enough to change valley type, but still unconfined.	☐ Human-caused change in valley type, unconfined or narrow changed to confined.								
served through the presence of nickpoints at or upstream of the mouth of a tributary. Bars with steep faces, usually occurring on the downstream end of a bar.	☐ No evidence of historic / present channel straightening, gravel mining, dredging and/or channel avulsions.	Evidence of minor bar scalping on a point bar and/or channel avulsion; but minor to no historic channel straightening, gravel mining, or dredging.	☐ Evidence of significant historic channel straightening, dredging, gravel mining and/or channel avulsions.	☐ Extensive historic channel straightening, commercial gravel mining, and/or recent channel avulsion.								
Stream Type Departure Type of STD:	No known flow alterations (i.e., increases in flow or decreases in sediment supply).	☐ Minor flow alterations, some flow increase and/or reduction of sediment load.	☐ Major historic flow alterations, greater flows and/or reduction of sediment load.	☐ Major existing flow alterations, greater flows and/or reduction of sediment load.								
Score: Historic	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1								
7.2 Channel AggradationShallow pool depths.Abundant sediment deposition	Complete riffle heads and deep pools in riffle-pool systems.** Full complement of expected bed features.	☐ Mostly complete riffles and/or some filling of pools with fine sediment. Pools may only be slightly deeper and wider than runs.**	☐ Incomplete riffles or dunes and dominated by runs. Significant filling of pools with sediment, pools may be absent with runs prevailing.	Riffle-pool or ripple-dune features replaced by plane bed features.								
on point bars and mid-channel bars and extensive sediment deposition at obstructions, channel constrictions, and at the upstream end of tight me-	☐ Minor point or delta bars present. Minor depositional features typically less than half bankfull stage in height.	☐ Single to multiple mid- channel or diagonal bars pre- sent. Minor depositional fea- tures typically less than half bankfull stage in height.	☐ Multiple unvegetated mid- channel or diagonal bars present. Major sediment buildup at the head of bendways leading to steep riffles and flood chutes.	☐ Multiple unvegetated mid- channel or diagonal bars pre- sent splitting or braiding flows even under low flow condi- tions.								
 ander bends. Islands may be present. Most of the channel bed is exposed during typical low flow periods. 	☐ No apparent increase in fine gravel/sand substrates (pebble count).**	Some increase in fine gravel/sand substrates that may comprise over 50% of the sediments.	Large incr. in fine gravel/ sand substrates that may com- prise over 70% of the sediments. Sediment feels soft underfoot.	Homogenous fine gravel/sand substrates may comprise over 90% of the sediments. Sediment feels soft underfoot.								
 High frequency of debris jams. 	☐ Low width/depth ratio ≤ 20 for C or B type channels ≤ 10 for E type channels	Low to moderate W/d ratio $>20 \le 30$ for C or B channels $>10 \le 12$ for E channels		High width/depth ratio >40 for C or B type channels >20 for E type channels								
Coarse gravels, cobbles, and boulders may be embedded with sand/silt and fine gravel. ** This parameter may be a	☐ No known flow alterations (i.e., decrease in flow or increase in sediment supply).	☐ Minor reduction in flow and/or increase in sediment load. Flood-related sediment working through reach, seen as enlarged bars.	☐ Major historic flow alterations, reduction in flows and / or increase in sediment load.	☐ Major existing flow alterations, extreme reduction in flows and / or increase in sediment load.								
difficult to infeasible to evaluate in ripple-dune stream types Stream Type Departure Type of STD:	☐ No human-made constrictions causing upstream deposition.	Human-made constrictions smaller than floodprone width, causing minor to moderate upstrm / dwnstrm deposition.	Human-made constrictions significantly smaller than floodprone width, causing major upstrm / dwnstrm deposition.	☐ Human-made constrictions significantly smaller than bankfull width, causing extensive upstrm / dwnstrm deposition and flow bifurcation.								
Score: Historic	20 19 18 17 16	15 14 13 12 11	10 0 8 7 6	5 4 3 2 1								

A 3°4	D	Condition Category																			
Adjustment	Proces	S	R	efere	nce		Good							Fair]	Poor		
7.3 Widening • Active undermin	ing of banl	ς	☐ Low w ≤ 20 for ≤ 10 for	C or B ty	ype cha	nnels	>20	≤ 30 f	noderate for C or B for E char	chan		>30	$0 \le 40 \text{ f}$	e to high or C or l or E cha	B chan	ratio nels	>40) for C	dth/depth or B type ype chan	channe	els
vegetation on bo channel; many to overhangs that hetation holding s Erosion on both banks in riffle se Recently expose	instable bar ave little veroils together right and lections.	nk eg- er. eft	sion at the at the riffle bank overh at top of ba	Little to no scour and ero- on at the base of both banks the riffle section. Negligible nk overhangs, fracture lines top of banks, leaning trees or shly exposed tree roots.			and end banks Some at top	☐ Minimal to moderate scot and erosion at the base of bot banks at the riffle section. Some overhangs, fracture line at top of banks, leaning trees and freshly exposed tree roots.				☐ Moderate to high scour and erosion at the base of both banks at the riffle section. Many bank overhangs, fracture lines at top of banks, leaning trees and freshly exposed tree roots.					exten the bariffle		ınk		
(fresh roots are 'not break easily, are brittle and wi	older roots	;	☐ Incisio	Incision Ratio $\geq 1.2 < 1.4$ and Entrenchment ratio > 2.0							Ratio > and ment rat			Incision ratio ≥ 2.0 OR Entrenchment ratio < 2.0							
ly in your hand).Fracture lines at bank that appear parallel to the rivMid-channel bar	as cracks ver.		Minor point or delta bars present. Depositional features less than half bankfull stage in height.				Chann sent.	ngle to el or d Minor typical	o multiple iagonal b deposition ly less that ge in heig	e mid- ars pr onal fe an hal	e- ea-	☐ Multiple unvegetated mid- channel or diagonal bars present. Major sediment buildup at the head of bendways leading to steep riffles and flood chutes.					Channes sent s	Aultiple nel or d splitting under l	unvegeta agonal b or braidi ow flow o	ars pre-	d-
 Urbanization and outfalls leading t and duration of r channel enlarger 	l stormwate o higher ra unoff and		No known channel and / or flow alterations (i.e., increase in flow and / or change in sediment supply)			☐ Mi input Episo throug	nor income of flow dic (flow gh reac	crease in vs or sedi- ood) disch h resultin nlargeme	water ment. narges		☐ Major channel and/or flow alterations, increase in flows and/or change in sediment load (increase or decrease).					☐ Major and extensive -chan- nel and/or flow alterations, increase in flows and/or change in sediment load (increase or decrease).					
Score:	Historic		20 19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
7.4 Change in	Planfor	m	☐ Low ba						noderate					e to high					e lateral l		
Flood chutes or may be present.Channel avulsion		fs	side bends, little or no change in sinuosity within the reach.				bank erosion on outside bends, may include minor change in sinuosity within the reach.				bends neck	s, may i	on mos	otentia	al	erosion on most outside bends, may include impending neck cut-offs and major change in sinuosity within the reach.				:	
 Change or loss in structure, someti in a mix of plane fle- pool forms. Island formation tiple thread chan 	n bed form mes resulti bed and ri and/or mu	f-	chutes crossing inside of me- ander bends, only minor point or delta bars.					☐ Minor flood chutes crossing inside of meander bends, evidence of minor to moderate unvegetated mid-channel, delta, or diagonal bars. Some potential for channel avulsion.				Historic or active flood chutes crossing inside of meander bends, evidence of channel avulsion, islands, and unvegetated mid-channel, delta, or diagonal bars.				ean- inel	Active large flood chutes crossing inside of most meander bends, evidence of recent channel avulsion, multiple thread channels, islands, and unvegetated mid-channel, delta, or diagonal bars.				ı- t
• In meandering st thalweg, or deep channel, typicall the outside of a r to the outside of ander bend. Poo	reams the est part of the y travels from meander be the next mails are locat	om nd e-	No add and scour in nel length by a single quence. The planform.	features i typically riffle-po	in the cl occupi ool se-	han- ed	Additional minor deposition and scour features in the channel length typically occupied by a single riffle-pool sequence.					Additional large deposition and scour features in the channel length typically occupied by a single riffle-pool sequence. Thalweg not lined up with planform.					☐ Multiple sequences of large deposition and scour features in the channel length typically occupied by a single riffle-pool sequence.				
on downstream third of the concave bends. Riffles are at the cross-over between the pools on successive bends. During planform adjustments, the thalweg may not line up			☐ No hur tion of cha or the widt area.	nnel pla	ınform a	and /	Minor to moderate alteration of channel planform and/or width of the floodprone area resulting from floodplain encroachment, channel straightening, or dredging.					Major alteration of channel planform and/or the width of the floodprone area resulting from historic floodplain encroachment, dredging, or channel straightening.					Major alteration of channel planform and width of the floodprone area resulting from recent and extensive floodplain encroachment, dredging, and/or channel straightening.				m iin
tension of meander bends, ad-			Human-made constrictions causing only negligible upstream deposition.				Human-made constrictions smaller than floodprone width, causing minor to moderate upstrm / downstrm deposition.				Human-made constrictions significantly smaller than floodprone width, causing major upstrm / downstrm deposition.				najor	Human-made constrictions significantly smaller than bankfull width, causing extensive and major upstrm / downstrm deposition and flow bifurcation.					
Score:	Historic		20 19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Condi Depar Degrada	tion ture tion	Ref	erence N/S	s – St Goo Min	od	Fa	Addition – Channel Evoluti Fair Poor STD Fajor Extreme							toric			tion Rating: Chann 1 Score / 80) Evolut Stage:			tion	
Aggrada Widenin							+							7.6 Stream Condi-		ndi-					

Channel Adjustment Processes:

Planform

- 7.7 Stream Sensitivity: Very Low / Low / Moderate / High / Very High / Extreme
- * Channel Condition "default" to **poor** significant flood damage (not able to get accurate channel data) Y/N;

tion:

- * Channel Condition default to poor Due to channel alterations from work in channel after flood: Y/N
- * Stream Sensitivity "default" to poor significant flood damage (not able to get accurate channel data) Y/N;
- * Stream Sensitivity "default" to poor Due to channel alterations from work in channel after flood: Y/N

VT RAPID GEOMORPHIC ASSESSMENT ----- PLANE BED STREAMS

Typically found in semi-confined to narrow valley types (confinement ratio ≥ 3 and $\leq 5)$

Reminder: This RGA form should only be used on streams which are plane bed systems by reference. Many existing plane bed streams in Vermont represent a departure from another stream type.

Stream Name:			Segment I.D:										
Location:		I	Date:										
			Town:ft.										
Observers:		F	Elevation: ft										
Organization /Agency:			Weather:										
Reference Stream Type	<u> </u>	☐ Modified I	Rain Storm within past 7 da	avs· Y / N									
reference stream Type	(If alluvial fan or naturally braided syste	m see Handbook Protocols)	tani Storii witini pust 7 di	ays. 1 / 11									
		Condition	n Category										
Adjustment Process	Reference	Good	Fair	Poor									
7.1 Channel Degradation (Incision)	Little evidence of localized slope increase or nickpoints.	☐ Minor localized slope increase or nickpoints.	Sharp change in slope, head cuts present, and/or tributaries rejuvenating.	Sharp change in slope and / or multiple head cuts present. Tributaries rejuvenating.									
 Exposed till or fresh substrate in the stream bed and exposed infrastructure (bridge footings). New terraces or recently abandoned floodplains. Headcuts, or nickpoints that are 2-3 times steeper than typ- 	□ Incision ratio ≥ 1.0 < 1.2 and Where channel slope > 2% Entrenchment ratio > 1.4 Where channel slope ≤ 2% Entrenchment ratio > 2.0 □ No significant human-	☐ Incision ratio $\geq 1.2 < 1.4$ and Where channel slope $> 2\%$ Entrenchment ratio > 1.4 Where channel slope $\leq 2\%$ Entrenchment ratio > 2.0 ☐ Only minor human-caused	□ Incision ratio ≥ 1.4 < 2.0 and Where channel slope > 2% Entrenchment ratio > 1.4 Where channel slope ≤ 2% Entrenchment ratio > 2.0 □ Significant human-caused										
ical riffle. • Freshly eroded, vertical banks. • Alluvial (river) sediments that	caused change in channel confinement or valley type.	change in channel confinement but no change in valley type.	change in channel confinement enough to change valley type, but still not narrowly confined.	narrowly confined valley type.									
are imbricated (stacked like dominoes) high in bank. Tributary rejuvenation, observed through the presence of nickpoints at or upstream of	No evidence of historic or present channel straightening, gravel mining, dredging and/or channel avulsions.	Extensive historic channel straightening, commercial gravel mining, and/or recent channel avulsion.											
the mouth of a tributary. Stream Type Departure Type of STD:	☐ No known flow alterations (i.e., increases in flow or decreases in sediment supply).	☐ Minor flow alterations, some flow increase and/or minor reduction of sediment load.	☐ Major historic flow alterations, greater flows and/or reduction of sediment load.	☐ Major existing flow alterations, greater flows and/or reduction of sediment load.									
Score: Historic	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1									
 7.2 Channel Aggradation Very shallow pocket pools around and below boulders. Abundant sediment deposition on side, point and midchannel bars and extensive sediment deposition at obstructions, channel constrictions, and at the upstream 	☐ Minor side, point or delta bars present. Minor depositional features typically less than half bankfull stage in height. ☐ No apparent increase in fine gravel/sand substrates (pebble count).	☐ Single to multiple mid- channel or diagonal bars pre- sent. Minor depositional fea- tures typically less than half bankfull stage in height. ☐ Some increase in fine gravel/sand substrates that may comprise over 50% of the sediments.	☐ Multiple unvegetated midchannel or diagonal bars present. Sediment buildup at the head of bendways leading to steep riffles and flood chutes. ☐ Large increase in fine gravel/sand substrates that may comprise over 70% of the sediments. Fine sediment feels soft underfoot.	☐ Multiple unvegetated midchannel or diagonal bars present splitting or braiding flows even under low flow conditions. ☐ Homogenous fine gravel/sand substrates may comprise over 90% of the sediments. Fine sediment feels soft underfoot.									
end of tight bendways. Islands may be present. • Most of the channel bed is		Low to moderate W/d ratio $W/d > 20 \le 30$		High width/depth ratio W/d >40									
exposed during typical low flow periods. • Increased frequency of woody debris in channel.	☐ No known flow alterations (i.e., decrease in flow or increase in sediment supply).	☐ Minor reduction in flow and/or increase in sediment load. Flood-related sediment working through reach, seen as enlarged bars.	☐ Major historic flow alterations, reduction in flows and / or increase in sediment load.	☐ Major existing flow alterations, extreme reduction in flows and / or increase in sediment load.									
Coarse gravels, cobbles, and boulders may be embedded with sand/silt and fine gravel. Stream Type Departure Type of STD:	□ No human-made constrictions causing upstream deposition.	Human-made constrictions smaller than floodprone width, causing minor to moderate upstrm / dwnstrm deposition.	Human-made constrictions significantly smaller than floodprone width, causing major upstrm / dwnstrm deposition.	Human-made constrictions significantly smaller than bankfull width, causing extensive upstrm / dwnstrm deposition and flow bifurcation.									
Score: Historic □	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1									

A divistment Dropes	Condition Category																		
Adjustment Process	R	eferei		(Good	l				Fair			Poor						
7.3 Widening Channel	□ Low v	width/dep W/d < 20	th ratio	,			moderat		d ratio			e to high		ratio	□ I		dth/dept W/d >40		
 Active undermining of bank vegetation on both sides of the channel; many unstable bank overhangs that have little veg- etation holding soils together. Erosion on both right and left banks in riffle sections. 	Little sion at the Negligible fracture lin leaning tree posed tree	to no scor base of t bank over nes at top ees or fres	banks. Some overhangs, frac- ture lines at top of banks, lean- ing trees and freshly exposed					Moderate to high scour and erosion at the base of both banks. Many bank overhangs, fracture lines at top of banks, leaning trees and freshly exposed tree roots.					Continuous and laterally extensive scour and erosion at the base of both banks. Continuous bank overhangs, fracture lines at top of banks, leaning trees and freshly exposed tree roots.						
 Recently exposed tree roots (fresh roots are 'green' and do not break easily, older roots are brittle and will break easily in your hand). Fracture lines at the top of the 	Where cha	and annel slop chment r	oe > 2% atio > 1 oe <u><</u> 2%	6 1.4 6	$\begin{array}{ c c c c } \textbf{and} & & & & \\ Where channel slope > 2\% & & & Where chann\\ Entrenchment ratio > 1.4 & & Entrench\\ Where channel slope \leq 2\% & & Where chann\\ \end{array}$							Incision Ratio $\geq 1.4 < 2.0$ and The creck channel slope $> 2\%$ Entrenchment ratio > 1.4 are channel slope $\leq 2\%$ Entrenchment ratio > 2.0				Incision ratio ≥ 2.0 and Where channel slope $> 2\%$ Entrenchment ratio ≤ 1.4 Where channel slope $\leq 2\%$ Entrenchment ratio ≤ 2.0			
 bank that appear as cracks parallel to the river. Mid-channel bars and side bars may be present. Urbanization and stormwater 	☐ Minor bars prese tional feat than half beight.	nt. Mino ures typic	☐ Single to multiple mid- channel or diagonal bars pre- sent. Minor depositional fea- tures typically less than half bankfull stage in height.					☐ Multiple unvegetated mid- channel or diagonal bars present. Sediment buildup at the head of bendways leading to steep riffles and flood chutes.					☐ Multiple unvegetated mid- channel or diagonal bars pre- sent splitting or braiding flows even under low flow condi- tions.						
outfalls leading to higher rate and duration of runoff and channel enlargement.	☐ No kn flow altera in flow an ment supp	ations (i.e d/or chan	Minor increase in water- shed input of flows or sedi- ment. Episodic (flood) dis- charges through reach resulting in short-term enlargement.						Major channel and / or flow alterations, increase in flows and/or change in sediment load (increase or decrease).					☐ Major and extensive -chan- nel and/or flow alterations, increase in flows and / or change in sediment load (in- crease or decrease).					
Score: Historic □	20 19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
7.4 Change in PlanformFlood chutes may be present.Channel avulsions may be	Low be side bends in sinuosit								on mos	most outside erosion on most outside bends, may include major change in sinuosity within the reach.									
 evident or impending. Change or loss in bed form structure, sometimes resulting in a mix of plane bed and riffle- pool forms. Island formation and/or mul- 	Little evidence of flood chutes crossing inside of bends, only minor side, point, or delta bars.					☐ Minor flood chutes crossing inside of bends, evidence of single to multiple unvegetated mid-channel, delta, or diagonal bars. Some potential for channel avulsion.					Historic or active flood chutes crossing inside of bends, evidence of channel avulsion, islands, and multiple unvegetated mid-channel, delta, or diagonal bars.					Active large flood chutes, evidence of recent channel avulsion, multiple thread channels, islands, and multiple unvegetated mid-channel, delta, or diagonal bars.			
tiple thread channels.	No hu tion of cha or the wid area.	nnel pla	and /	☐ Minor to moderate alteration of channel planform and/or width of the floodprone area resulting from floodplain encroachment, channel straightening, or dredging.					☐ Major alteration of channel planform and/or the width of the floodprone area resulting from historic floodplain encroachment, dredging, or channel straightening.					Major alteration of channel planform and width of the floodprone area resulting from recent and extensive floodplain encroachment, dredging, and/or channel straightening.					
	Huma causing or stream dep	nly neglig			Human-made constrictions smaller than floodprone width, causing minor to moderate upstrm / downstrm deposition.					Human-made constrictions significantly smaller than floodprone width, causing major upstrm / downstrm deposition.					Human-made constrictions significantly smaller than bankfull width, causing extensive and major upstrm / downstrm deposition and flow bifurcation.				
Score: Historic	20 19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
7.5 Channel Adjustm	ent Score	es – Sti	ream	Con	ditio	n – C	hann	nel F	Evolut	ion S	Stage								
Condition R Departure Degradation	eference N/S	Goo Min	od	F	air ajor	I	Poor xtreme		STD			toric		nditio Fotal S			Channel Evolution Stage:		
Aggradation Widening Planform Sub-totals:								7	Γotal S	core:			7.6 Stream Condition:						
Channel Adjustme	ent Proce	sses:																	
7.7 Stream Sensitivity	v: Very L	ow /					_		•	_									
* Channel Condition "	default" t	o poor	• – sig	gnific	ant fl	lood o	tamag	ge (1	not abl	le to g	get ac	curate	e chai	nnel d	lata) `	Y/N ;			

- * Channel Condition default to poor Due to channel alterations from work in channel after flood: Y/N
- * Stream Sensitivity "default" to **poor** significant flood damage (not able to get accurate channel data) **Y/N**: * Stream Sensitivity "default" to **poor** Due to channel alterations from work in channel after flood: **Y/N**